N - REMOVE/INSTALL/OVERHAUL - 4.3L

1997 ENGINE PERFORMANCE General Motors - Removal, Overhaul & Installation - 4.3L

INTRODUCTION

This article contains removal, overhaul and installation procedures (when information was available at time of publication). If component removal and installation is primarily an unbolt and bolt-on procedure, only a torque specification may be furnished.

AIR INDUCTION SYSTEMS

THROTTLE BODY (CSI)

Removal & Installation

1. Disconnect negative battery cable. Remove air inlet duct fastener and duct. Disconnect IAC valve and TP sensor electrical connectors. Disconnect throttle and cruise control cables.
2. Remove accelerator cable bracket bolts and bracket. Remove wiring harness fastener nut and throttle body fasteners. Remove throttle body assembly. Remove flange gasket and discard.
3. Clean gasket surface on intake manifold and throttle body. Install NEW flange gasket. Install throttle body. Tighten throttle body fasteners to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure. Ensure throttle and cruise control linkages do not hold throttle open.

UPPER INTAKE MANIFOLD ASSEMBLY (CSI)

Removal

1. Disconnect negative battery cable. Remove air inlet fastener and duct. Disconnect injector electrical connector. Relieve fuel pressure. See **FUEL SYSTEM PRESSURE RELIEF** under FUEL SYSTEM.
2. Disconnect throttle and cruise control cables from throttle lever cam and bracket. Disconnect power brake and crankcase ventilation valve vacuum hoses at upper manifold and valve cover. Disconnect electrical harness connectors from TP sensor, IAC valve and MAP sensor.
3. Disconnect No. 1 plug wire from distributor cap. Remove fuel pipe clip retaining bolt. Remove injector fuel inlet and outlet pipe retainer and nuts. Remove upper manifold assembly, attaching bolts and rear mounting nuts (position canister purge solenoid bracket to one side).

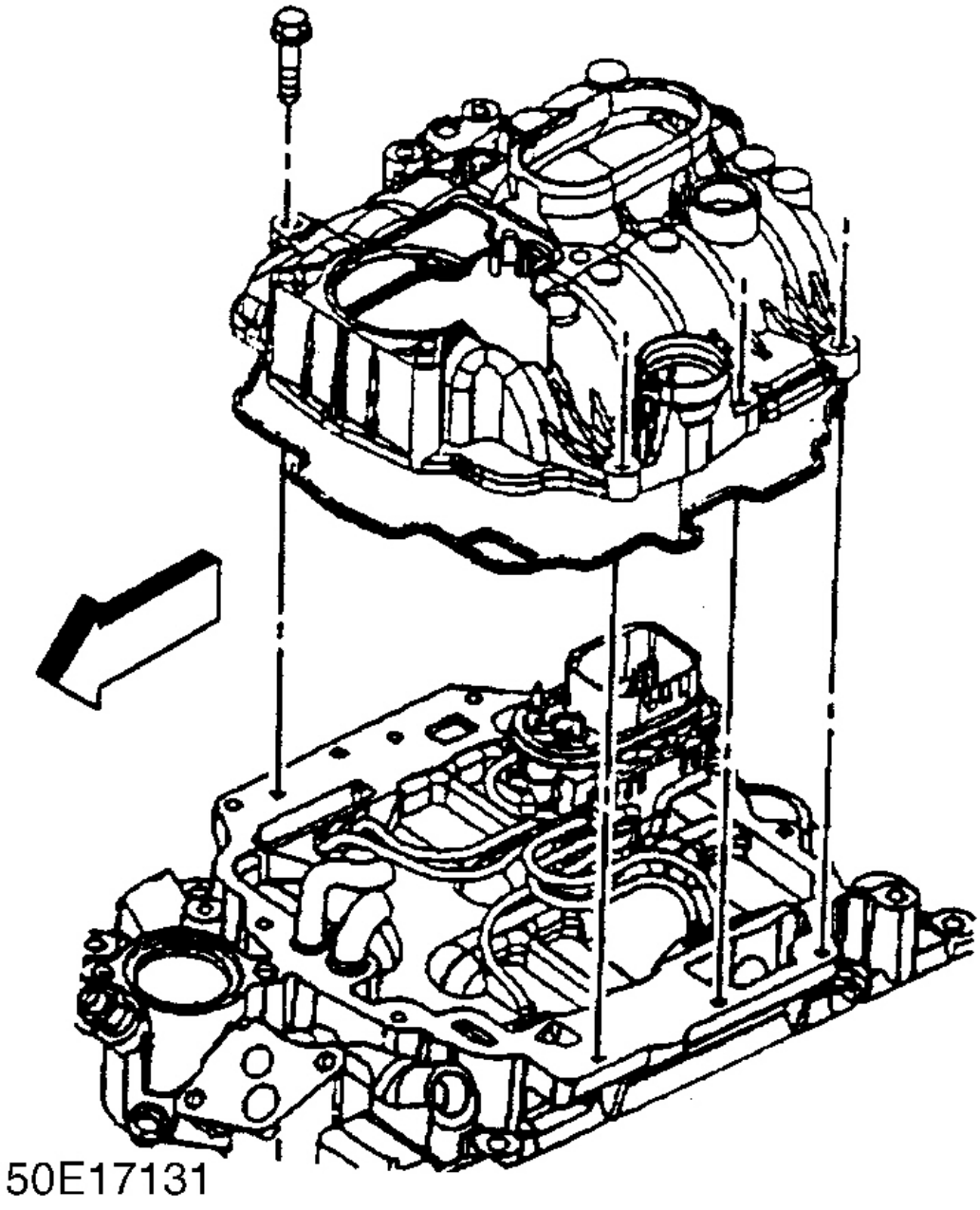

Fig. 1: Upper Intake Manifold Assembly
Courtesy of GENERAL MOTORS CORP.

Disassembly

1. When cleaning or replacing upper manifold assembly, remove throttle cable bracket attaching bolts and

bracket, throttle body assembly, MAP sensor, crankcase ventilation valve, purge solenoid and power brake booster vacuum pipe fitting.

CAUTION: DO NOT soak upper manifold assembly in an immersion type cleaner or any cleaner containing MEK.

2. Upper manifold assembly contains TP sensor, IAC valve and internal throttle shaft sealed ball bearings. These components MUST NOT be subjected to strong solvent or cleaner bath. Clean throttle bore and valve deposits with carburetor cleaner and a shop towel. Use care when cleaning gasket surfaces. Sharp tools may damage sealing surfaces.

Installation

To install, reverse removal procedure. Tighten upper intake manifold assembly fasteners to specification using a criss-cross pattern. See **TORQUE SPECIFICATIONS** .

COMPUTERIZED ENGINE CONTROLS

POWERTRAIN CONTROL MODULE (PCM)

CAUTION: All vehicles are equipped with either an Engine Control Module (ECM), Powertrain Control Module (PCM) or Vehicle Control Module (VCM) for engine control. Unless specifically stated, references to PCM also apply to ECM and VCM equipped vehicles. Some vehicles equipped with an electronically controlled transmission also use a Transmission Control Module (TCM) for transmission control. Electronic components used in control systems are designed to carry very low voltages. As little as a 30-volt charge created by static electricity can cause a total or degrading failure in PCM or other electronic components containing integrated circuits. Before servicing PCM, technician must ground himself/herself and work area to discharge static electricity.

CAUTION: DO NOT remove part from packaging until ready to install. Ground any static-proof package before opening. DO NOT touch electrical terminals of components unless properly grounded. DO NOT lay electrical components on car seat, carpeting or dashboard. Use electrostatic protection mat and ground strap whenever possible.

NOTE: Before replacing PCM, carefully inspect all wiring and control components. Failure to test for short circuits may result in repeated PCM failure due to shorts and Quad-Driver failure. To prevent internal damage to PCM, ensure ignition switch is in OFF position when connecting or disconnecting PCM connectors or any electrical components.

NOTE: When replacing defective PCM, remove knock sensor module from defective

PCM. New PCM does not come equipped with knock sensor module. Install knock sensor module into new PCM.

Removal

Ensure ignition switch is in OFF position. Disconnect negative battery cable. Unplug electrical connectors from PCM. Remove PCM from vehicle. Remove access cover and remove knock sensor module from PCM.

Installation

Install knock sensor module in NEW PCM. Install access cover. Install PCM into vehicle. Connect electrical connectors to PCM. Reconnect negative battery cable.

ELECTRICALLY ERASABLE PROGRAMMABLE READ-ONLY MEMORY

Electrically Erasable Programmable Read-Only Memory (EEPROM) is a permanent memory that is part of PCM. EEPROM cannot be replaced. EEPROM contains program and calibration information that PCM uses to control powertrain. If PCM is replaced, ensure that NEW PCM software/calibration is correct and most recent version for vehicle. EEPROM must be programmed when new PCM is installed. Program EEPROM using latest software for that specific vehicle.

KNOCK SENSOR MODULE

Removal & Installation

1. Knock Sensor (KS) module is located in PCM. Disconnect negative battery cable. Remove PCM from vehicle. See **POWERTRAIN CONTROL MODULE (PCM)** . Position PCM with access cover up. Remove access cover from PCM.
2. Using thumb and forefinger, squeeze both ends of knock sensor module inward and pull module up from access hole. To install, reverse removal procedure. Ensure module latches into holder in PCM.

NOTE: If PCM is replaced, KS module must be transferred from original to replacement PCM.

SENSORS & SWITCHES

CAMSHAFT POSITION SENSOR

Removal & Installation

1. Disconnect negative battery cable. Reference mark spark plug wires at distributor cap. Disconnect spark plug wires and ignition coil wire at distributor cap.
2. Disconnect Camshaft Position (CMP) sensor electrical connector at distributor. Remove distributor cap retaining screws and distributor cap.
3. Remove rotor retaining screws and rotor. Align the square slot in the reluctor wheel with the CMP sensor. Remove CMP sensor retaining screws. Remove CMP sensor. See **Fig. 2** .

NOTE: DO NOT use the old distributor cap screws, CMP sensor screws, or rotor screws. Use replacement screws that have been coated with a thread locking compound.

4. Insert the CMP sensor through the reluctor wheel slot. Install NEW CMP sensor retaining screws coated with a thread locking compound. Tighten CMP sensor retaining screws to specification. See **TORQUE SPECIFICATIONS** .
5. To complete installation, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

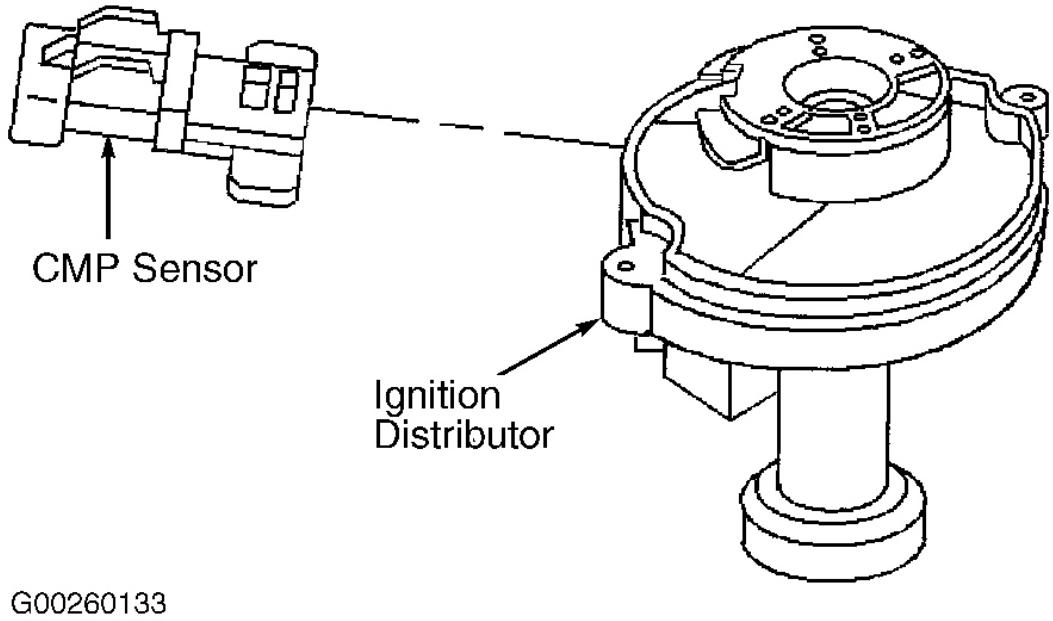

Fig. 2: Locating Camshaft Position Sensor
Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT POSITION SENSOR

Removal

Crankshaft Position (CKP) sensor is a magnetic sensor and is located behind the crankshaft pulley, mounted near front of crankshaft. Disconnect CKP sensor electrical connector. Remove CKP sensor mounting bolt. See **Fig. 3** . Remove CKP sensor.

Installation

NOTE: Make certain that the Crankshaft Position (CKP) sensor mounting surfaces

are clean and free of burrs before installing the CKP sensor.

1. Inspect the Crankshaft Position (CKP) sensor "O" ring for wear, cracks or leakage. Replace if necessary. Lubricate the "O" ring with clean engine oil before installation.

NOTE: When installing or removing a CKP sensor, ensure the sensor is fully seated and held stationary in the front cover before tightening the hold-down bolt into the front cover. A sensor which is not seated may result in erratic operation and lead to the setting of false trouble codes.

2. Tighten CKP sensor hold-down bolt to specification. See **TORQUE SPECIFICATIONS** . Connect CKP sensor electrical connector.
3. Perform Crankshaft Position (CKP) Variation Learn procedure using scan tool. See **CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (4.3L, 5.0L, 5.7L & 7.4L)** in COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION.

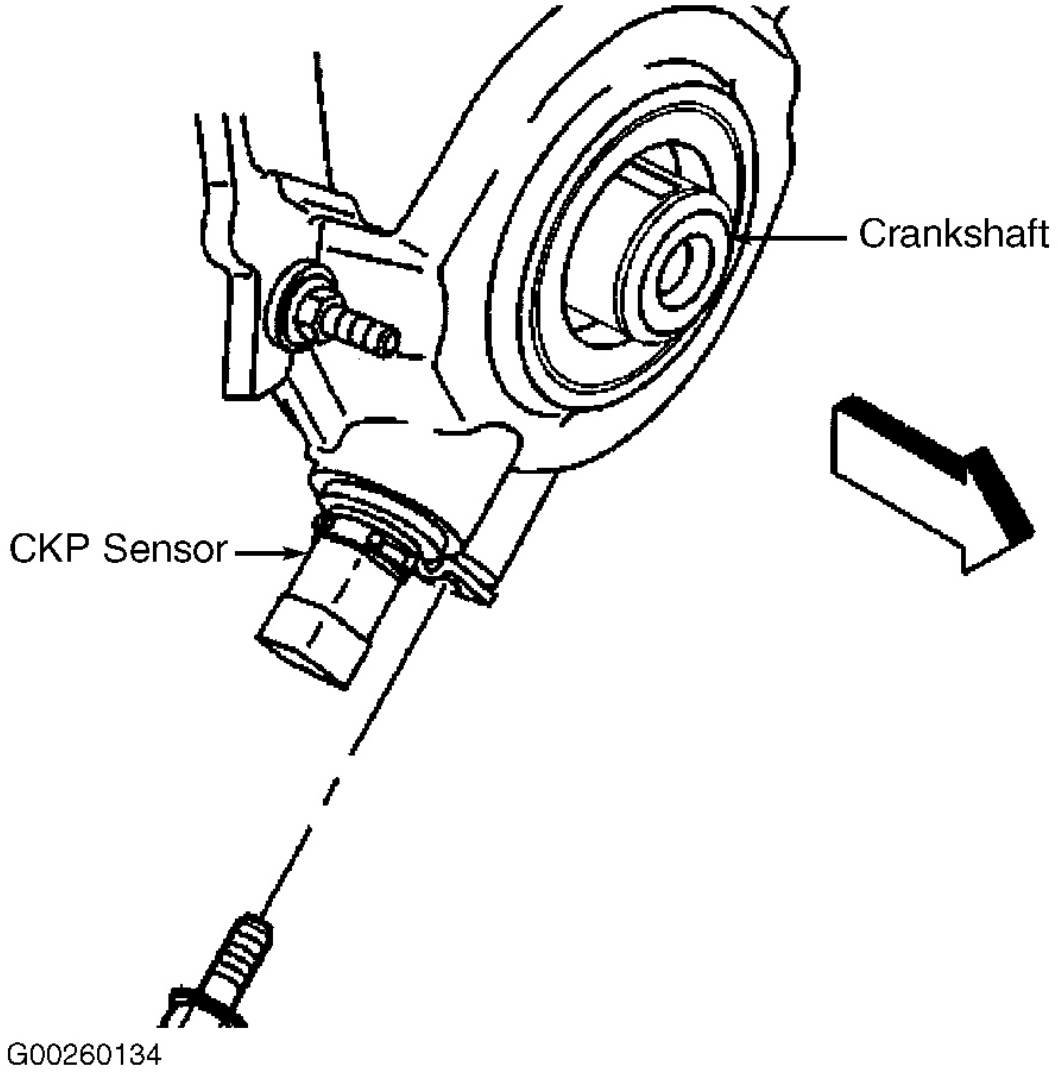

Fig. 3: Locating Crankshaft Position Sensor
Courtesy of GENERAL MOTORS CORP.

KNOCK SENSOR

NOTE: Cooling system may need draining prior to removing knock sensor.

Removal & Installation

Knock sensor is located on side of engine block. See **Fig. 4** . Disconnect negative battery cable. Disconnect wiring harness connector from knock sensor. Remove knock sensor. To install, reverse removal procedure. Install sealant to sensor threads prior to installation. Tighten knock sensor to 14 ft. lbs. (19 N.m).

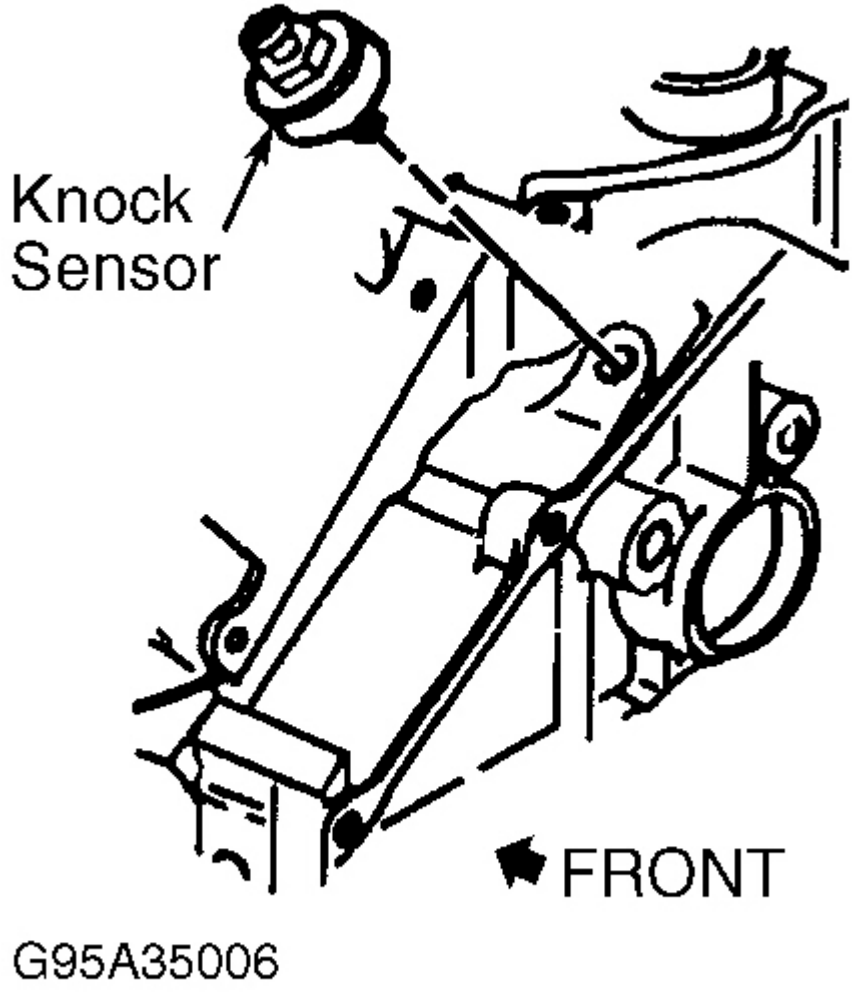

Fig. 4: Locating Knock Sensor
Courtesy of GENERAL MOTORS CORP.

OXYGEN SENSOR

CAUTION: Oxygen sensor is equipped with a permanent pigtail, which must be protected to prevent damage when removing sensor.

Removal

1. Oxygen sensor is mounted in exhaust manifold/pipe. Ensure sensor is free of contaminants. DO NOT use

cleaning solvents of any type. Sensor may be difficult to remove when engine temperature is less than 120°F (48°C). Excessive removal force may damage threads in exhaust manifold or pipe.

2. Disconnect negative battery cable. Disconnect electrical connector from oxygen sensor. Carefully remove oxygen sensor.

CAUTION: Correct torque of oxygen sensor is critical to prevent crushing glass beads in graphite anti-seize compound. Crushing glass beads will cause sensor to seize in exhaust manifold/pipe. This may require replacement of exhaust manifold/pipe upon next removal.

Installation

1. Whenever oxygen sensor is removed, coat threads with anti-seize compound before reinstalling. New oxygen sensors already have this compound applied to threads.
2. Install oxygen sensor in exhaust manifold/pipe and tighten sensor to 30 ft. lbs. (41 N.m). Reconnect electrical connector to oxygen sensor. Reconnect negative battery cable.

THROTTLE POSITION (TP) SENSOR

Removal & Installation

1. Remove air cleaner assembly. Disconnect electrical connector from TP sensor. Remove attaching screws, lock washers, retainers, and TP sensor.
2. To install, reverse removal procedure. Adjust TP sensor to specification. See the **ADJUSTMENTS - 4.3L** article. When replacing a TP sensor, ensure correct part number is used. Use Loctite on TP sensor attaching screws.

MOTORS, RELAYS & SOLENOIDS

IDLE AIR CONTROL VALVE

Removal

Disconnect Idle Air Control (IAC) valve harness connector. Remove IAC valve retaining screws and remove IAC valve.

CAUTION: DO NOT manually extend or retract pintle if IAC valve has been in service. Damage to worm gear will result.

Installation

1. Inspect "O" ring for damage. Replace if necessary. If reusing IAC valve, DO NOT push or pull on pintle. Threads on worm gear will be damaged.
2. If replacing IAC valve, measure distance between tip of new IAC valve pintle and mounting flange. Distance should not exceed 1 1/8" (28 mm). If distance is more than specified, use finger pressure to

slowly retract pintle. Lubricate "O" ring with clean engine oil.

3. Apply thread locking compound (Loctite 262) to IAC valve retaining screw threads. Install IAC valve. Tighten IAC valve retaining screws to 27 INCH lbs. (3 N.m). Connect IAC valve harness connector.
4. To reset IAC valve pintle position, turn ignition on for 5 seconds. Turn ignition off for 10 seconds. Start engine and check for proper idle operation. Repeat IAC valve resetting procedure if proper idle operation cannot be obtained.

FUEL SYSTEM

FUEL SYSTEM PRESSURE RELIEF

1. Disconnect negative battery cable. Loosen fuel filler cap to relieve fuel tank pressure. Install Fuel Pressure Gauge (J-34730-1) to fuel pressure connection.
2. Wrap shop towel around pressure connection when installing fuel pressure gauge to absorb fuel leakage. Place gauge bleed hose into suitable container. Open bleed valve to bleed fuel pressure.

FUEL METER BODY ASSEMBLY

Removal

1. Disconnect negative battery cable. Relieve fuel system pressure. Remove upper intake manifold assembly and throttle body. See **UPPER INTAKE MANIFOLD ASSEMBLY (CSI)** under AIR INDUCTION SYSTEMS.

NOTE: When disconnecting poppet nozzles, note installation sequence.

2. Disconnect fuel meter body electrical connector. Remove fuel feed and return hoses from fuel pipes. Squeeze poppet nozzle locking tabs together while lifting nozzle out of the casting socket. Remove fuel meter body from bracket by releasing lock tabs on bracket.

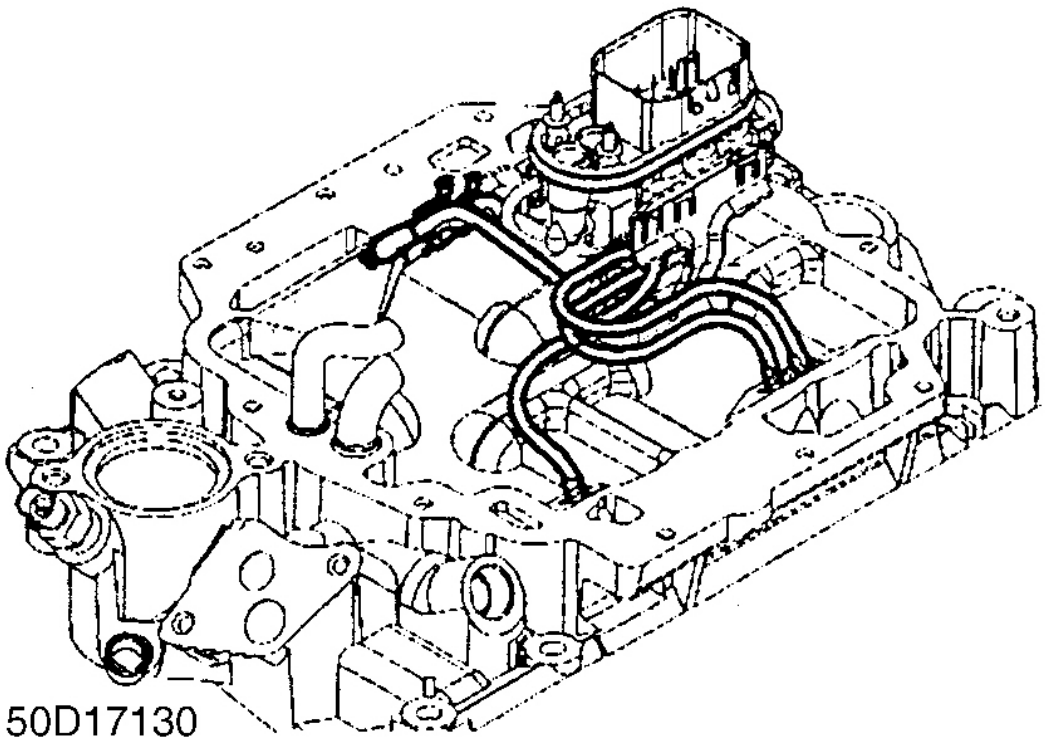

Fig. 5: Fuel Meter Body Assembly
Courtesy of GENERAL MOTORS CORP.

Installation

1. Install fuel meter body on intake manifold. Tighten fuel meter attachment bolts to 88 INCH lbs. (10 N.m). Push fuel meter body into bracket. Ensure tabs are locked into place.

CAUTION: To reduce risk of fire, ensure that poppet nozzles are firmly seated and locked in their sockets. Unlocked poppet nozzles can become loose which can result in fuel leaks.

NOTE: Fuel meter body assemblies are numbered indicating nozzle order.

2. Push poppet nozzles into casting sockets. Inspect poppet nozzles to ensure they are firmly seated and locked. Connect fuel meter body electrical connector.
3. Install new O-rings on fuel feed and return pipes. Install fuel feed and return hoses on engine fuel pipes. Tighten fuel pipe nuts to 22 ft. lbs. (30 N.m). Connect negative battery cable. Turn ignition ON for 2 seconds. Ignition OFF for 10 seconds. Turn ignition ON. Check for fuel leaks and correct as necessary.
4. Install upper intake manifold assembly. See **UPPER INTAKE MANIFOLD ASSEMBLY (CSI)** under

AIR INDUCTION SYSTEMS. Install fuel filler cap.

FUEL PRESSURE REGULATOR

Removal & Installation

1. Relieve fuel system pressure. See **FUEL SYSTEM PRESSURE RELIEF** . Disconnect negative battery cable. Remove ignition coil.
2. Remove upper intake manifold plenum. See **UPPER INTAKE MANIFOLD ASSEMBLY (CSI)** under AIR INDUCTION SYSTEMS.
3. Disconnect vacuum line to fuel pressure regulator. Remove snap ring from fuel pressure regulator housing. Place a towel under fuel pressure regulator to catch any fuel.
4. Twist fuel pressure regulator back and forth while pulling from fuel rail socket. Remove fuel pressure regulator. Remove and discard fuel pressure regulator "O" rings.
5. Install fuel pressure regulator using NEW "O" rings, lubricated with clean engine oil. Ensure fuel pressure regulator vacuum tube is pointing down. To complete installation, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

FUEL PUMP

NOTE: When installing sending unit, DO NOT fold or twist strainer. This will restrict fuel flow.

Removal & Installation

1. Relieve fuel system pressure. See **FUEL SYSTEM PRESSURE RELIEF** . Disconnect negative battery cable. Raise vehicle and remove fuel tank. Using Sending Unit Remover (J-36608 or J-24187), remove sending unit and pump by turning cam lock counterclockwise.
2. Remove fuel pump from sending unit by pulling pump up into attaching hose while pulling outward from the bottom support. DO NOT damage rubber insulator or strainer. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

IGNITION SYSTEM

CAMSHAFT POSITION SENSOR

See **CAMSHAFT POSITION SENSOR** under SENSORS & SWITCHES.

CRANKSHAFT POSITION SENSOR

See **CRANKSHAFT POSITION SENSOR** under SENSORS & SWITCHES.

DISTRIBUTOR

WARNING: Procedure A may be used for distributor installation if crankshaft has not

been rotated from original position when distributor was removed. If intake manifold, cylinder head, crankshaft, camshaft, timing gear, or complete engine was removed or replaced, Procedure B must be followed. If DTC P1345 is present, distributor may be installed incorrectly, and must be reinstalled with Procedure B.

Removal

1. Ignition OFF. Remove spark plug and coil leads from distributor cap. Disconnect hall-effect switch connector from base of distributor. Remove distributor cap.
2. With a grease pencil, mark rotor position on distributor body, and label "#1". Remove distributor clamp hold-down bolt. Slowly remove distributor. Rotor will turn 42° counter-clockwise as distributor is removed. Mark new rotor position on distributor body with a grease pencil as "#2".

NOTE: If distributor is being replaced, transfer grease pencil marks from original distributor to new distributor.

Installation (Procedure A)

1. Align rotor to "#2" mark on distributor body. Guide distributor into place noting alignment of mounting hole in distributor hold down base with hole in intake manifold.
2. Rotor will rotate 42° clockwise as distributor is installed. If rotor does not align with "#1" mark, remove distributor and reinstall using INSTALLATION (PROCEDURE B). Remaining installation is reverse of removal.

NOTE: If DTC P1345 is present, distributor may be installed incorrectly, and must be reinstalled with Procedure B.

Installation (Procedure B)

1. Rotate engine until cylinder 1 is at TDC of compression stroke. Align indent hole of distributor gear with white alignment line on lower part of distributor shaft housing. Rotor should point to distributor cap hold down hole nearest to flat side of distributor body.
2. Using a long screwdriver, align oil pump drive shaft with drive tab of distributor. Slowly install distributor, ensuring that spark plug towers are perpendicular to center line of engine.
3. When fully seated, rotor should be aligned with pointer cast into distributor body (pointer is marked with a "6" to indicate distributor is for 6-cylinder engine). If rotor is not aligned within a few degrees of pointer, remove distributor and return to step 1). Remaining installation is reverse of removal.

NOTE: If DTC P1345 is present, distributor may be installed incorrectly, and must be reinstalled with Procedure B.

KNOCK SENSOR

See **KNOCK SENSOR** under SENSORS & SWITCHES.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	**Ft. Lbs. (N.m)**
Distributor Clamp Bolt	20 (27)
Fuel Line Nut	17 (23)
Fuel Tank Strap Nuts	33 (45)
Idle Air Control Valve (Threaded)	13 (18)
Oxygen Sensor	30 (41)
Throttle Body-To-Upper Intake Manifold Fasteners	18 (24)
	INCH Lbs. (N.m)
Camshaft Position Sensor Retaining Screws	14-25 (1.6-2.8)
Crankshaft Position Sensor Bolt	71 (8)
Distributor Cap Retaining Screws	21 (2.5)
Distributor Rotor Retaining Screws	17 (2)
Fuel Meter Body Fasteners	88 (10)
Idle Air Control Valve Screws (Flange Mounted)	27 (3)
Ignition Coil Studs	106 (12)
Upper Intake Manifold Fasteners (1)	
Step 1	44 (5)
Step 2	89 (10)
(1) Tighten fasteners to specification in a criss-cross pattern.	